

# SammieStage3

## Stage 3 - Plan Learning Experiences and Instruction

**Note:** How are you using technology as a teacher? How are your students using technology?

**(W)** .1 Students understand that....(**Where**), Real Life (**Why**), MLR or CCSS (**What**)

**(H)** .2 Engage (**Hook**)

**(E)** .3 Students will know...(Equip), [Graphic Organizer](#) and [Cooperative Learning](#) the content (**Explore**), working on product (partners, teams...) (**Experience**)

**(R)** .4 Checking for Understanding Strategies during instruction (**Rethink**), Self-Assessment using Rubrics or Checklist, feedback by students (**Rethink/Revise**), and feedback by teacher on Product (**Revise/Refine**),

**(E)** .5 Formative Assessment - List the one's used in this lesson. (**Evaluate**)

**(T)** .6 Give an example of each Multiple Intelligences (**Tailor**)

[Verbal-Linguistic](#)

[Logical/Mathematical](#)

[Visual/Spatial](#)

[Bodily/Kinesthetic](#)

[Musical/Rhythmic](#)

[Intrapersonal](#)

[Interpersonal](#)

[Naturalist](#)

**(O)** .7 Students will be able to ...( **Organize**), Product: Type II Technology, Number of Days:

[Recipes4Success Lesson Library](#) . Here you will find exciting, standards-based lessons for Tech4Learning products. Each lesson includes step-by-step directions for both teachers and students, as well as links to high-quality examples, templates, and support resources.

## Lesson 1

**Consider the W.H.E.R.E.T.O. elements. (L)**

**(W)** 1.1 Students will understand that choosing the appropriate mathematical model for a given situation requires examining the data from more than one perspective. (**WHERE**), Being able to predict outcomes is a powerful tool for planning for our futures (**WHY**), *Construct and compare linear, quadratic, and exponential models and solve problems.* (**WHAT**)

**(H)** 1.2 Learning is all about exploring new things and being great observers. Math allows us to explore with the intent of discovering patterns and creating models. Today we begin the exploration of a new and powerful function, the exponential function!

**(E)1.3** Students will know *vocabulary*: data, exponential growth/decay, regression coefficient, *critical Ideas*: data requires critical evaluation in order to model appropriately with a mathematical representation, *formulas*:  $A = Pe^{rt}$ ,  $y = mx + b$  **(Equip)**, Students will use a Step-by-step graphic organizer to plan the steps of collecting data, graphing data and analyzing the prospective graphs of data **(Explore)**, Students will "Circle the Sage" to teach each other how to graph sets of data **(Experience)**

**(R) 1.4** Using the responses from Google survey, teacher will reteach examples that are similar to frequently missed questions **(Rethink/Revise)**, teacher will be checking for incorrect plots/models and giving feedback as students are graphing their data sets and best-fit models **(Rethink)**

**(E)1.5 Pre-Assessment:** Google forms pre-test over exponents checking for misconceptions, **Check for Understanding:** Exit Slips, Informal checks for understanding of objectives (students give a 1-10 rating), **Timely Feedback:** Teacher feedback on preliminary graphs **(Evaluate)**

**(T) 1.6** Students will . . .

Verbal/Linguistic: Record and discuss data and relationships.

Logical: Sort, graph and analyze data to find best fit models.

Visual: Graph data sets and analyze the regression coefficients of different models.

Musical: Review slope-intercept form with the " $y = mx + b$ " song and dance!

Kinesthetic: Review slope-intercept form with the " $y = mx + b$ " song and dance!

Interpersonal: Participate in the "Circle the Sage" cooperative learning activity.

Intrapersonal: Work independently to complete Googledocs pre-test survey.

Naturalist: Examine the data set that represents the growth rate of natural bacteria.

**(O)1.7** Students will be able to analyze data to determine what type of function would best fit the data. **(Perspective)**

**Product:** Graph: Use excel to record and graph the best-fit model for a data set regarding a post-secondary education loan.

**Number of Days: 2**

## Lesson 2

**Consider the W.H.E.R.E.T.O. elements. (L)**

**(W)2.1** Students will understand that exponential functions grow by equal factors over equal intervals, not by equal differences over equal intervals **(WHERE)**, the rates of change of linear functions and exponential functions behave differently and allow us to model different situations, **(WHY)**, *Construct and compare linear, quadratic, and exponential models and solve problems. (WHAT)*

**(H) 2.2** Would you like to be a novice predictor or would you like to predict with POWER? Today you will investigate  $r$  and its impact on the world!

**(E)2.3** Students will know *vocabulary*: data, exponential growth/decay, regression coefficient, *critical Ideas*:

data requires critical evaluation in order to model appropriately with a mathematical representation, *formulas*:

$A = Pe^{rt}$ ,  $y = mx + b$  (**Equip**), Students will use a t-chart to collect data before graphing in the TI-83 graphing calculators, (**Explore**), Students will "Think-Pair-Share" to discuss the process of finding best fit models (**Experience**)

(**R**)2.4 Students will compare their regression coefficients for different data sets and models throughout the period, when students' answers are inconsistent they will have a rich discussion of process (**Rethink**), students will use the lab checklist as a guide to self-assess (**Rethink/Revise**), students will receive informal feedback as the teacher monitors and assists.

(**E**)2.5 **Check for Understanding:** Informal 1-10 checks, **Timely Feedback:** Teacher feedback on lab reports using rubric (**Evaluate**)

(**T**) 2.6 Students will . . .

Verbal/Linguistic: Record and discuss data and relationships.

Logical: Sort, graph and analyze data to find best fit models.

Visual: Graph data sets and analyze the regression coefficients of different models.

Musical: Review slope-intercept form with the " $y = mx + b$ " song and dance!

Kinesthetic: Review slope-intercept form with the " $y = mx + b$ " song and dance!

Interpersonal: "Think-Pair-Share" to discuss the process of finding best fit models.

Intrapersonal: Self-assess using lab checklist.

(**O**)2.7 Students will be able to test the regression coefficient of linear and exponential functions. (**Apply**)

**Product:** Lab Report: Write a lab report detailing the results of an experiment testing the regression coefficient of linear, quadratic and exponential models against a set of data. Use a Ti-83 graphing calculator to test the fit models.

**Number of Days:** 1

## Lesson 3

**Consider the W.H.E.R.E.T.O. elements. (L)**

(**W**)3.1 Students will understand that exponential functions grow by equal factors over equal intervals, not by equal differences over equal intervals (**WHERE**), the rates of change of linear functions and exponential functions behave differently and allow us to model different situations, (**WHY**), *Construct and compare linear, quadratic, and exponential models and solve problems.* (**WHAT**)

(**H**) 3.2 How can we use what we know about lines to connect to this new idea of exponential growth? Today we become investigators trying to find the thread that ties these two mathematical concepts together!

(**E**)3.3 Students will know *vocabulary*: exponential growth/decay, regression coefficient, *critical Ideas*: data requires critical evaluation in order to model appropriately with a mathematical representation, *formulas*:  $A =$

$Pe^{rt}$ ,  $y = mx + b$  (**Equip**), Students will use Omni-Graffle to compare and contrast the rates of change of linear versus exponential functions (**Explore**), Students will have opportunities to ask clarifying questions during sporadic three minute reviews (**Experience**)

(**R**)3.4 Students will complete rate of change problems on the board simultaneously for peer and teacher review (**Rethink**), students will peer edit slope calculations and discuss (**Rethink/Revise**), Students will mini-conference in small groups with teacher over incorrect problems (**Refine**)

(**E**)3.5 **Check for Understanding:** small-group conferences for clarification, **Timely Feedback:** Teacher feedback on Venn-Diagrams (**Evaluate**)

(**T**) 3.6 Students will . . .

Verbal/Linguistic: Record and discuss rates of change of functions.

Logical: Sort and analyze rates of change of functions.

Visual: Examine graphic representations of rates of change of functions.

Interpersonal: Mini-conference with teacher in small groups.

Intrapersonal: Work independently comparing rates of change of functions.

Naturalist: Evaluate word problems that contain natural exponential growth of colonies of organisms.

(**O**)3.7 Students will be able to evaluate the rates of change of linear and exponential functions. (**Interpret**)

**Product:** Poster: Create a Venn-Diagram using Omni-graffle to compare and contrast the rates of change of linear and exponential functions.

**Number of Days:** 1

## Lesson 4

**Consider the W.H.E.R.E.T.O. elements. (L)**

(**W**)4.1 Students will understand that choosing the appropriate mathematical model for a given situation requires examining the data from more than one perspective. (**WHERE**), Being able to predict outcomes is a powerful tool for planning for our futures (**WHY**), *Construct and compare linear, quadratic, and exponential models and solve problems.* (**WHAT**)

(**H**) 4.2 The powers to predict and infer are great ones indeed! Wouldn't you like to be able to predict what comes next . . .

(**E**)4.3 Students will know *vocabulary:* exponential growth/decay, principal, interest, amortization, *critical Ideas:* principal, interest and time are the three factors that influence pay off amounts for loans, *formulas:*  $A = Pe^{rt}$ , (**Equip**), Students will use a "tool tester" worksheet to explore the functions of the GeoGebra software program before designing their model (**Explore**), Students will participate in a "give and take" conference with a peer (**Experience**)

(**R**)4.4 Teacher will demonstrate how to build a quadratic model with variable parameters using GeoGebra

**(Rethink)**, Students may access GeoGebra wiki to examine exemplars and creative techniques,  
**(Rethink/Revise)**, Students will peer review the visual appeal of each others applet and make suggestions  
**(Refine)**

**(E)4.5 Check for Understanding:** Verbal quizzing of the impact of factors (principal, time, interest), **Timely Feedback:** Teacher feedback on "sliders" in applet **(Evaluate)**

**(T) 4.6** Students will . . .

Verbal/Linguistic: Evaluate various outcomes given specific parameters.

Logical: Use a linear progression to build an interactive exponential model.

Visual: Create an interactive model that graphically represents interest, time and principal.

Interpersonal: Participate in review and critique of peers' work.

Intrapersonal: Evaluate various outcomes given specific parameters.

Naturalist: Compare exponential growth with the natural base "e" to exponential growths that compounds monthly, daily, hourly, etc.

**(O)4.7** Students will be able to model exponential functions for given parameters and use their models to predict outcomes. **(Explain)**

**Product:** Model: Create an interactive model with variable input for principal, rate and time using GeoGebra as a platform

**Number of Days: 1**

## Lesson 5

**Consider the W.H.E.R.E.T.O. elements. (L)**

**(W)5.1** Students will understand that principal, interest and time are factors that impact financial outcomes in unique, yet critical ways. **(WHERE)**, Being cognizant of the unique implications of these factors will enable consumers to make wise financial decisions that lead to saving money. **(WHY)**, *Construct and compare linear, quadratic, and exponential models and solve problems.* **(WHAT)**

**(H) 5.2** Today you begin the lofty task of thinking about your futures. You will investigate your futures armed with the knowledge of the impact of factors like principal, interest and time on exponential growth.

**(E)5.3** Students will know *vocabulary*: exponential growth/decay, principal, interest, amortization, *critical Ideas*: principal, interest and time are the three factors that influence pay off amounts for loans, *formulas*:  $A = Pe^{rt}$ ,  $y = mx + b$  **(Equip)**, Students will use a story board to plan the stages of their debate, **(Explore)**, Students will play Musical Chairs every 15 minutes in order to view other students progress, leaving a praise and constructive critique at each desk **(Experience)**

**(R)5.4** Students will check peer progress at regular intervals to compare and contrast **(Rethink/Revise)**,

Students will use debate rubric to self-assess (**Refine**)

**(E)5.5 Check for Understanding:** exit slips, comparative calculations with peers, **Timely Feedback:** Teacher feedback on scripts (**Evaluate**)

**(T) 5.6** Students will . . .

Verbal/Linguistic: Script debates.

Logical: Script debates.

Visual: Create a visual representation of their debate.

Kinesthetic: Practice their roles for the debates.

Interpersonal: Check peer progress at regular intervals with debate rubric.

Intrapersonal: Work independently on practice problems.

**(O)5.7** Students will be able to assume the role of a perspective college student with given financial resources and career plans. (**Empathy**)

**Product:** Debate: Script a debate between parent and student discussing the pros and cons of different post-secondary scenarios and use Xtra-normal to produce a video of the debate.

**Number of Days: 2**

## Lesson 6

**Consider the W.H.E.R.E.T.O. elements. (L)**

**(W)6.1** Students will understand that principal, interest and time are factors that impact financial outcomes in unique, yet critical ways. (**WHERE**), Being cognisant of the unique implications of these factors will enable consumers to make wise financial decisions that lead to saving money. (**WHY**), *Construct and compare linear, quadratic, and exponential models and solve problems.* (**WHAT**)

**(H) 6.2** The age old question, "What do you want to be when you grow up?", is loaded with complexity and implications. Over the course of the next few classes you will examine tools and strategies that will take some of the guess work out of this question and help you to know yourselves, know your options and become wise to the lasting effects that these decisions will have on you.

**(E)6.3** Students will know *vocabulary:* data, exponential growth/decay, principal, interest, amortization, regression coefficient, *critical Ideas:* principal, interest and time are the three factors that influence pay off amounts for loans, *formulas:*  $A = Pe^{rt}$ , (**Equip**), Students will use a PowerPoint template as a rough draft to plan their presentation (**Explore**), Students will do progress checks aligned to the class project time line at the beginning and end of each class (**Experience**)

**(R)6.4** Students will conference with teacher to solicit feedback on progress every other class period

**(Rethink/Revise)**, Students will post final products to class wiki prior to turning them in for assessment, peers will use the rubrics and checklist to give feedback for last minute revisions **(Refine)**

**(E)6.5 Check for Understanding:** Progress Slips, Resource checks, **Timely Feedback:** Teacher feedback on preliminary calculations **(Evaluate)**

**(T)6.6** Students will . . .

Verbal/Linguistic: Write a conclusion based on research findings.

Logical: Develop a research-based presentation on career choices.

Visual: Use graphic models to demonstrate comparative rates, time and payoffs.

Musical: Record presentation using PowerPoint or Keynote.

Kinesthetic: Present financial report to the class.

Interpersonal: Peer-review projects and give informative feed-back.

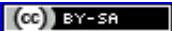
Intrapersonal: Work independently to create financial report.

**(O)6.7** Students will be able to reflect on the cost-to-benefit ratio of post-secondary decisions. **(Self-Knowledge)**

**Product:** Financial report containing analysis of two distinct career/education paths

**Number of Days:** 4

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